SPEC CPU®2017 Floating Point Rate Result

Dell Inc.

PowerEdge T350 (Intel Xeon E-2378, 2.60 GHz)

SPECrate®2017_fp_base = 51.8

SPECrate®2017_fp_peak = 55.8
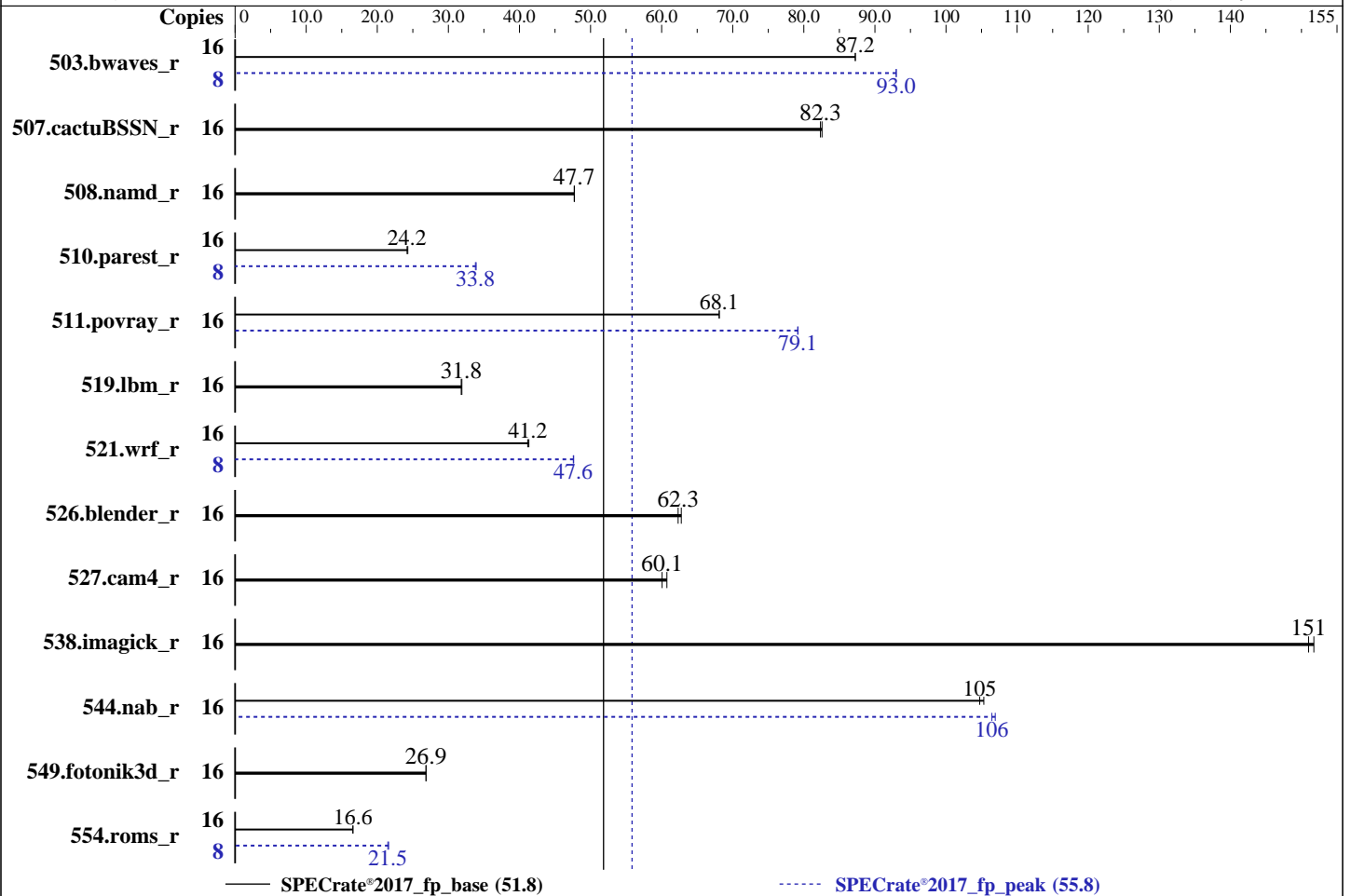
CPU2017 License: 55
Test Sponsor: Dell Inc.
Tested by: Dell Inc.

Test Date: Sep-2021
Hardware Availability: Oct-2021
Software Availability: May-2021

Benchmark	Copies	base	peak
503.bwaves_r	16 / 8	87.2	93.0
507.cactuBSSN_r	16	82.3	
508.namd_r	16	47.7	
510.parest_r	16 / 8	24.2	33.8
511.povray_r	16	68.1	79.1
519.lbm_r	16	31.8	
521.wrf_r	16 / 8	41.2	47.6
526.blender_r	16	62.3	
527.cam4_r	16	60.1	
538.imagick_r	16	151	
544.nab_r	16	105	106
549.fotonik3d_r	16	26.9	
554.roms_r	16 / 8	16.6	21.5

SPECrate®2017_fp_base (51.8)
SPECrate®2017_fp_peak (55.8)

Hardware

CPU Name: Intel Xeon E-2378
 Max MHz: 4800
 Nominal: 2600
Enabled: 8 cores, 1 chip, 2 threads/core
Orderable: 1 chip
Cache L1: 32 KB I + 48 KB D on chip per core
 L2: 512 KB I+D on chip per core
 L3: 16 MB I+D on chip per chip
 Other: None
Memory: 64 GB (2 x 32 GB 2Rx8 PC4-3200AA-E)
Storage: 70 GB on tmpfs
Other: None

Software

OS: Red Hat Enterprise Linux 8.4 (Ootpa)
 4.18.0-305.el8.x86_64
Compiler: C/C++: Version 2021.1 of Intel oneAPI DPC++/C++
 Compiler Build 20201113 for Linux;
 Fortran: Version 2021.1 of Intel Fortran Compiler
 Classic Build 20201112 for Linux;
 C/C++: Version 2021.1 of Intel C/C++ Compiler
 Classic Build 20201112 for Linux
Parallel: No
Firmware: Version 1.0.1 released Aug-2021
File System: tmpfs
System State: Run level 3 (multi-user)
Base Pointers: 64-bit
Peak Pointers: 64-bit
Other: jemalloc memory allocator V5.0.1
Power Management: BIOS and OS set to prefer performance
 at the cost of additional power usage.

Standard Performance Evaluation Corporation (info@spec.org)   https://www.spec.org/

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$$SPECrate®2017\_fp\_base = 51.8$$

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CPU2017 License: 55	**Test Date:**	Sep-2021
Test Sponsor: Dell Inc.	**Hardware Availability:**	Oct-2021
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Results Table

Benchmark	Base							Peak						
	Copies	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio	Copies	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio
503.bwaves_r	16	**1839**	**87.2**	1839	87.2			8	**863**	**93.0**	863	93.0		
507.cactuBSSN_r	16	**246**	**82.3**	245	82.6			16	**246**	**82.3**	245	82.6		
508.namd_r	16	**319**	**47.7**	318	47.7			16	**319**	**47.7**	318	47.7		
510.parest_r	16	**1730**	**24.2**	1723	24.3			8	617	33.9	**619**	**33.8**		
511.povray_r	16	549	68.1	**549**	**68.1**			16	472	79.2	**472**	**79.1**		
519.lbm_r	16	529	31.9	**530**	**31.8**			16	529	31.9	**530**	**31.8**		
521.wrf_r	16	**871**	**41.2**	867	41.3			8	**377**	**47.6**	376	47.6		
526.blender_r	16	388	62.8	**391**	**62.3**			16	388	62.8	**391**	**62.3**		
527.cam4_r	16	**466**	**60.1**	461	60.7			16	**466**	**60.1**	461	60.7		
538.imagick_r	16	262	152	**264**	**151**			16	262	152	**264**	**151**		
544.nab_r	16	**257**	**105**	256	105			16	**253**	**106**	252	107		
549.fotonik3d_r	16	**2322**	**26.9**	2321	26.9			16	**2322**	**26.9**	2321	26.9		
554.roms_r	16	**1534**	**16.6**	1534	16.6			8	**592**	**21.5**	589	21.6		
SPECrate®2017_fp_base =		**51.8**												
SPECrate®2017_fp_peak =		**55.8**												

Results appear in the order in which they were run. Bold underlined text indicates a median measurement.

Submit Notes

The taskset mechanism was used to bind copies to processors. The config file option 'submit' was used to generate taskset commands to bind each copy to a specific processor. For details, please see the config file.

Operating System Notes

Stack size set to unlimited using "ulimit -s unlimited"

Environment Variables Notes

Environment variables set by runcpu before the start of the run:
LD_LIBRARY_PATH =
    "/mnt/ramdisk/cpu2017-1.1.8-ic2021.1/lib/intel64:/mnt/ramdisk/cpu2017-1.
    1.8-ic2021.1/je5.0.1-64"
MALLOC_CONF = "retain:true"

General Notes

Binaries compiled on a system with 1x Intel Core i9-7980XE CPU + 64GB RAM
memory using Red Hat Enterprise Linux 8.1
Transparent Huge Pages enabled by default

(Continued on next page)

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$SPECrate^{®}2017\_fp\_base = 51.8$

$SPECrate^{®}2017\_fp\_peak = 55.8$

General Notes (Continued)

```
Prior to runcpu invocation
Filesystem page cache synced and cleared with:
sync; echo 3>        /proc/sys/vm/drop_caches
jemalloc, a general purpose malloc implementation
built with the RedHat Enterprise 7.5, and the system compiler gcc 4.8.5
sources available from jemalloc.net or https://github.com/jemalloc/jemalloc/releases

NA: The test sponsor attests, as of date of publication, that CVE-2017-5754 (Meltdown)
is mitigated in the system as tested and documented.
Yes: The test sponsor attests, as of date of publication, that CVE-2017-5753 (Spectre variant 1)
is mitigated in the system as tested and documented.
Yes: The test sponsor attests, as of date of publication, that CVE-2017-5715 (Spectre variant 2)
is mitigated in the system as tested and documented.

Benchmark run from a 70 GB ramdisk created with the cmd: "mount -t tmpfs -o size=70G tmpfs /mnt/ramdisk"
```

Platform Notes

```
BIOS settings:
     Virtualization Technology : Disabled

               System Profile : Custom
          CPU Power Management : Maximum Performance
                          C1E : Disabled
                     C States : Autonomous
          PCI ASPM L1 Link
             Power Management : Disabled

Sysinfo program /mnt/ramdisk/cpu2017-1.1.8-ic2021.1/bin/sysinfo
Rev: r6622 of 2021-04-07 982a61ec0915b55891ef0e16acafc64d
running on localhost.localdomain Fri Sep  3 11:32:19 2021

SUT (System Under Test) info as seen by some common utilities.
For more information on this section, see
   https://www.spec.org/cpu2017/Docs/config.html#sysinfo

From /proc/cpuinfo
   model name : Intel(R) Xeon(R) E-2378 CPU @ 2.60GHz
      1  "physical id"s (chips)
      16 "processors"
   cores, siblings (Caution: counting these is hw and system dependent. The following
   excerpts from /proc/cpuinfo might not be reliable.  Use with caution.)
      cpu cores : 8
      siblings  : 16
      physical 0: cores 0 1 2 3 4 5 6 7
```

(Continued on next page)

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CPU2017 License: 55
Test Sponsor: Dell Inc.
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Test Date: Sep-2021
Hardware Availability: Oct-2021
Software Availability: May-2021

Platform Notes (Continued)

```
From lscpu from util-linux 2.32.1:
     Architecture:          x86_64
     CPU op-mode(s):        32-bit, 64-bit
     Byte Order:            Little Endian
     CPU(s):                16
     On-line CPU(s) list:   0-15
     Thread(s) per core:    2
     Core(s) per socket:    8
     Socket(s):             1
     NUMA node(s):          1
     Vendor ID:             GenuineIntel
     BIOS Vendor ID:        Intel
     CPU family:            6
     Model:                 167
     Model name:            Intel(R) Xeon(R) E-2378 CPU @ 2.60GHz
     BIOS Model name:       Intel(R) Xeon(R) E-2378 CPU @ 2.60GHz
     Stepping:              1
     CPU MHz:               4497.770
     BogoMIPS:              5184.00
     Virtualization:        VT-x
     L1d cache:             48K
     L1i cache:             32K
     L2 cache:              512K
     L3 cache:              16384K
     NUMA node0 CPU(s):     0-15
     Flags:                 fpu vme de pse tsc msr pae mce cx8 apic sep mtrr pge mca cmov
     pat pse36 clflush dts acpi mmx fxsr sse sse2 ss ht tm pbe syscall nx pdpe1gb rdtscp
     lm constant_tsc art arch_perfmon pebs bts rep_good nopl xtopology nonstop_tsc cpuid
     aperfmperf tsc_known_freq pni pclmulqdq dtes64 monitor ds_cpl vmx smx est tm2 ssse3
     sdbg fma cx16 xtpr pdcm pcid sse4_1 sse4_2 x2apic movbe popcnt tsc_deadline_timer
     aes xsave avx f16c rdrand lahf_lm abm 3dnowprefetch cpuid_fault invpcid_single ssbd
     ibrs ibpb stibp ibrs_enhanced fsgsbase tsc_adjust bmi1 avx2 smep bmi2 erms invpcid
     mpx avx512f avx512dq rdseed adx smap avx512ifma clflushopt intel_pt avx512cd sha_ni
     avx512bw avx512vl xsaveopt xsavec xgetbv1 xsaves dtherm ida arat pln pts avx512vbmi
     umip pku ospke avx512_vbmi2 gfni vaes vpclmulqdq avx512_vnni avx512_bitalg
     avx512_vpopcntdq rdpid fsrm md_clear flush_l1d arch_capabilities

/proc/cpuinfo cache data
   cache size : 16384 KB

From numactl --hardware
WARNING: a numactl 'node' might or might not correspond to a physical chip.
  available: 1 nodes (0)
  node 0 cpus: 0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15
  node 0 size: 64027 MB
  node 0 free: 42426 MB
```

(Continued on next page)

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CPU2017 License: 55　　　　　　　　　　　　　　　　　　　**Test Date:**　　　　　Sep-2021
Test Sponsor:　Dell Inc.　　　　　　　　　　　　　　　**Hardware Availability:** Oct-2021
Tested by:　　　Dell Inc.　　　　　　　　　　　　　　　**Software Availability:**　May-2021

Platform Notes (Continued)

```
  node distances:
  node   0
    0:  10

 From /proc/meminfo
    MemTotal:       65564648 kB
    HugePages_Total:       0
    Hugepagesize:       2048 kB

 /sbin/tuned-adm active
     Current active profile: throughput-performance

 From /etc/*release* /etc/*version*
    os-release:
       NAME="Red Hat Enterprise Linux"
       VERSION="8.4 (Ootpa)"
       ID="rhel"
       ID_LIKE="fedora"
       VERSION_ID="8.4"
       PLATFORM_ID="platform:el8"
       PRETTY_NAME="Red Hat Enterprise Linux 8.4 (Ootpa)"
       ANSI_COLOR="0;31"
    redhat-release: Red Hat Enterprise Linux release 8.4 (Ootpa)
    system-release: Red Hat Enterprise Linux release 8.4 (Ootpa)
    system-release-cpe: cpe:/o:redhat:enterprise_linux:8.4:ga

 uname -a:
    Linux localhost.localdomain 4.18.0-305.el8.x86_64 #1 SMP Thu Apr 29 08:54:30 EDT 2021
    x86_64 x86_64 x86_64 GNU/Linux

 Kernel self-reported vulnerability status:

 CVE-2018-12207 (iTLB Multihit):                        Not affected
 CVE-2018-3620 (L1 Terminal Fault):                     Not affected
 Microarchitectural Data Sampling:                      Not affected
 CVE-2017-5754 (Meltdown):                              Not affected
 CVE-2018-3639 (Speculative Store Bypass):              Mitigation: Speculative Store
                                                        Bypass disabled via prctl and
                                                        seccomp
 CVE-2017-5753 (Spectre variant 1):                     Mitigation: usercopy/swapgs
                                                        barriers and __user pointer
                                                        sanitization
 CVE-2017-5715 (Spectre variant 2):                     Mitigation: Enhanced IBRS, IBPB:
                                                        conditional, RSB filling
 CVE-2020-0543 (Special Register Buffer Data Sampling): Not affected
 CVE-2019-11135 (TSX Asynchronous Abort):               Not affected
```

(Continued on next page)

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Software Availability: May-2021

Platform Notes (Continued)

```
  run-level 3 Sep 3 06:40

  SPEC is set to: /mnt/ramdisk/cpu2017-1.1.8-ic2021.1
     Filesystem      Type    Size  Used Avail Use% Mounted on
     tmpfs           tmpfs    70G   16G   55G  23% /mnt/ramdisk

  From /sys/devices/virtual/dmi/id
     Vendor:          Dell Inc.
     Product:         PowerEdge T350
     Product Family:  PowerEdge
     Serial:          B50KFF3

  Additional information from dmidecode 3.2 follows.  WARNING: Use caution when you
  interpret this section. The 'dmidecode' program reads system data which is "intended to
  allow hardware to be accurately determined", but the intent may not be met, as there are
  frequent changes to hardware, firmware, and the "DMTF SMBIOS" standard.
    Memory:
      2x 00CE00000C01 M391A4G43AB1-CWE 32 GB 2 rank 3200

  BIOS:
     BIOS Vendor:       Dell Inc.
     BIOS Version:      1.0.1
     BIOS Date:         08/18/2021
     BIOS Revision:     1.0

  (End of data from sysinfo program)
```

Compiler Version Notes

```
==============================================================================
C                  | 519.lbm_r(base, peak) 538.imagick_r(base, peak)
                   | 544.nab_r(base, peak)
------------------------------------------------------------------------------
Intel(R) oneAPI DPC++/C++ Compiler for applications running on Intel(R) 64,
  Version 2021.1 Build 20201113
Copyright (C) 1985-2020 Intel Corporation. All rights reserved.
------------------------------------------------------------------------------


==============================================================================
C++                | 508.namd_r(base, peak) 510.parest_r(base, peak)
------------------------------------------------------------------------------
Intel(R) oneAPI DPC++/C++ Compiler for applications running on Intel(R) 64,
  Version 2021.1 Build 20201113
Copyright (C) 1985-2020 Intel Corporation. All rights reserved.
------------------------------------------------------------------------------
```

(Continued on next page)

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Hardware Availability: Oct-2021
Software Availability: May-2021

Compiler Version Notes (Continued)

```
================================================================================
C++, C             | 511.povray_r(peak)
--------------------------------------------------------------------------------
Intel(R) C++ Intel(R) 64 Compiler Classic for applications running on
  Intel(R) 64, Version 2021.1 Build 20201112_000000
Copyright (C) 1985-2020 Intel Corporation.  All rights reserved.
Intel(R) C Intel(R) 64 Compiler Classic for applications running on Intel(R)
  64, Version 2021.1 Build 20201112_000000
Copyright (C) 1985-2020 Intel Corporation.  All rights reserved.
--------------------------------------------------------------------------------


================================================================================
C++, C             | 511.povray_r(base) 526.blender_r(base, peak)
--------------------------------------------------------------------------------
Intel(R) oneAPI DPC++/C++ Compiler for applications running on Intel(R) 64,
  Version 2021.1 Build 20201113
Copyright (C) 1985-2020 Intel Corporation. All rights reserved.
Intel(R) oneAPI DPC++/C++ Compiler for applications running on Intel(R) 64,
  Version 2021.1 Build 20201113
Copyright (C) 1985-2020 Intel Corporation. All rights reserved.
--------------------------------------------------------------------------------


================================================================================
C++, C             | 511.povray_r(peak)
--------------------------------------------------------------------------------
Intel(R) C++ Intel(R) 64 Compiler Classic for applications running on
  Intel(R) 64, Version 2021.1 Build 20201112_000000
Copyright (C) 1985-2020 Intel Corporation.  All rights reserved.
Intel(R) C Intel(R) 64 Compiler Classic for applications running on Intel(R)
  64, Version 2021.1 Build 20201112_000000
Copyright (C) 1985-2020 Intel Corporation.  All rights reserved.
--------------------------------------------------------------------------------


================================================================================
C++, C             | 511.povray_r(base) 526.blender_r(base, peak)
--------------------------------------------------------------------------------
Intel(R) oneAPI DPC++/C++ Compiler for applications running on Intel(R) 64,
  Version 2021.1 Build 20201113
Copyright (C) 1985-2020 Intel Corporation. All rights reserved.
Intel(R) oneAPI DPC++/C++ Compiler for applications running on Intel(R) 64,
  Version 2021.1 Build 20201113
Copyright (C) 1985-2020 Intel Corporation. All rights reserved.
--------------------------------------------------------------------------------


================================================================================
C++, C, Fortran | 507.cactuBSSN_r(base, peak)
--------------------------------------------------------------------------------
```

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Compiler Version Notes (Continued)

```
Intel(R) oneAPI DPC++/C++ Compiler for applications running on Intel(R) 64,
  Version 2021.1 Build 20201113
Copyright (C) 1985-2020 Intel Corporation. All rights reserved.
Intel(R) oneAPI DPC++/C++ Compiler for applications running on Intel(R) 64,
  Version 2021.1 Build 20201113
Copyright (C) 1985-2020 Intel Corporation. All rights reserved.
Intel(R) Fortran Intel(R) 64 Compiler Classic for applications running on
  Intel(R) 64, Version 2021.1 Build 20201112_000000
Copyright (C) 1985-2020 Intel Corporation.  All rights reserved.
------------------------------------------------------------------------------


==============================================================================
Fortran          | 503.bwaves_r(base, peak) 549.fotonik3d_r(base, peak)
                 | 554.roms_r(base, peak)
------------------------------------------------------------------------------
Intel(R) Fortran Intel(R) 64 Compiler Classic for applications running on
  Intel(R) 64, Version 2021.1 Build 20201112_000000
Copyright (C) 1985-2020 Intel Corporation.  All rights reserved.
------------------------------------------------------------------------------


==============================================================================
Fortran, C       | 521.wrf_r(peak)
------------------------------------------------------------------------------
Intel(R) Fortran Intel(R) 64 Compiler Classic for applications running on
  Intel(R) 64, Version 2021.1 Build 20201112_000000
Copyright (C) 1985-2020 Intel Corporation.  All rights reserved.
Intel(R) C Intel(R) 64 Compiler Classic for applications running on Intel(R)
  64, Version 2021.1 Build 20201112_000000
Copyright (C) 1985-2020 Intel Corporation.  All rights reserved.
------------------------------------------------------------------------------


==============================================================================
Fortran, C       | 521.wrf_r(base) 527.cam4_r(base, peak)
------------------------------------------------------------------------------
Intel(R) Fortran Intel(R) 64 Compiler Classic for applications running on
  Intel(R) 64, Version 2021.1 Build 20201112_000000
Copyright (C) 1985-2020 Intel Corporation.  All rights reserved.
Intel(R) oneAPI DPC++/C++ Compiler for applications running on Intel(R) 64,
  Version 2021.1 Build 20201113
Copyright (C) 1985-2020 Intel Corporation. All rights reserved.
------------------------------------------------------------------------------


==============================================================================
Fortran, C       | 521.wrf_r(peak)
------------------------------------------------------------------------------
Intel(R) Fortran Intel(R) 64 Compiler Classic for applications running on
  Intel(R) 64, Version 2021.1 Build 20201112_000000
```

(Continued on next page)

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Compiler Version Notes (Continued)

```
Copyright (C) 1985-2020 Intel Corporation.  All rights reserved.
Intel(R) C Intel(R) 64 Compiler Classic for applications running on Intel(R)
  64, Version 2021.1 Build 20201112_000000
Copyright (C) 1985-2020 Intel Corporation.  All rights reserved.
-----------------------------------------------------------------------


==============================================================================
Fortran, C       | 521.wrf_r(base) 527.cam4_r(base, peak)
-----------------------------------------------------------------------
Intel(R) Fortran Intel(R) 64 Compiler Classic for applications running on
  Intel(R) 64, Version 2021.1 Build 20201112_000000
Copyright (C) 1985-2020 Intel Corporation.  All rights reserved.
Intel(R) oneAPI DPC++/C++ Compiler for applications running on Intel(R) 64,
  Version 2021.1 Build 20201113
Copyright (C) 1985-2020 Intel Corporation. All rights reserved.
-----------------------------------------------------------------------
```

Base Compiler Invocation

C benchmarks:
`icx`

C++ benchmarks:
`icpx`

Fortran benchmarks:
`ifort`

Benchmarks using both Fortran and C:
`ifort icx`

Benchmarks using both C and C++:
`icpx icx`

Benchmarks using Fortran, C, and C++:
`icpx icx ifort`

Base Portability Flags

503.bwaves_r: `-DSPEC_LP64`
507.cactuBSSN_r: `-DSPEC_LP64`
508.namd_r: `-DSPEC_LP64`
510.parest_r: `-DSPEC_LP64`

(Continued on next page)

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CPU2017 License: 55		**Test Date:**	Sep-2021
Test Sponsor:	Dell Inc.	**Hardware Availability:**	Oct-2021
Tested by:	Dell Inc.	**Software Availability:**	May-2021

Base Portability Flags (Continued)

511.povray_r: `-DSPEC_LP64`
519.lbm_r: `-DSPEC_LP64`
521.wrf_r: `-DSPEC_LP64 -DSPEC_CASE_FLAG -convert big_endian`
526.blender_r: `-DSPEC_LP64 -DSPEC_LINUX -funsigned-char`
527.cam4_r: `-DSPEC_LP64 -DSPEC_CASE_FLAG`
538.imagick_r: `-DSPEC_LP64`
544.nab_r: `-DSPEC_LP64`
549.fotonik3d_r: `-DSPEC_LP64`
554.roms_r: `-DSPEC_LP64`

Base Optimization Flags

C benchmarks:
`-w -std=c11 -m64 -Wl,-z,muldefs -xCORE-AVX512 -Ofast -ffast-math`
`-flto -mfpmath=sse -funroll-loops -qopt-mem-layout-trans=4`
`-mbranches-within-32B-boundaries -ljemalloc`
`-L/usr/local/jemalloc64-5.0.1/lib`

C++ benchmarks:
`-w -m64 -Wl,-z,muldefs -xCORE-AVX512 -Ofast -ffast-math -flto`
`-mfpmath=sse -funroll-loops -qopt-mem-layout-trans=4`
`-mbranches-within-32B-boundaries -ljemalloc`
`-L/usr/local/jemalloc64-5.0.1/lib`

Fortran benchmarks:
`-w -m64 -Wl,-z,muldefs -xCORE-AVX512 -O3 -ipo -no-prec-div`
`-qopt-prefetch -ffinite-math-only`
`-qopt-multiple-gather-scatter-by-shuffles -qopt-mem-layout-trans=4`
`-nostandard-realloc-lhs -align array32byte -auto`
`-mbranches-within-32B-boundaries -ljemalloc`
`-L/usr/local/jemalloc64-5.0.1/lib`

Benchmarks using both Fortran and C:
`-w -m64 -std=c11 -Wl,-z,muldefs -xCORE-AVX512 -Ofast -ffast-math`
`-flto -mfpmath=sse -funroll-loops -qopt-mem-layout-trans=4 -O3 -ipo`
`-no-prec-div -qopt-prefetch -ffinite-math-only`
`-qopt-multiple-gather-scatter-by-shuffles`
`-mbranches-within-32B-boundaries -nostandard-realloc-lhs`
`-align array32byte -auto -ljemalloc -L/usr/local/jemalloc64-5.0.1/lib`

Benchmarks using both C and C++:
`-w -m64 -std=c11 -Wl,-z,muldefs -xCORE-AVX512 -Ofast -ffast-math`
`-flto -mfpmath=sse -funroll-loops -qopt-mem-layout-trans=4`
`-mbranches-within-32B-boundaries -ljemalloc`

(Continued on next page)

Dell Inc.

PowerEdge T350 (Intel Xeon E-2378, 2.60 GHz)

SPECrate®2017_fp_base = 51.8

SPECrate®2017_fp_peak = 55.8

CPU2017 License: 55
Test Sponsor: Dell Inc.
Tested by: Dell Inc.

Test Date: Sep-2021
Hardware Availability: Oct-2021
Software Availability: May-2021

Base Optimization Flags (Continued)

Benchmarks using both C and C++ (continued):
```
-L/usr/local/jemalloc64-5.0.1/lib
```

Benchmarks using Fortran, C, and C++:
```
-w -m64 -std=c11 -Wl,-z,muldefs -xCORE-AVX512 -Ofast -ffast-math
-flto -mfpmath=sse -funroll-loops -qopt-mem-layout-trans=4 -O3
-no-prec-div -qopt-prefetch -ffinite-math-only
-qopt-multiple-gather-scatter-by-shuffles
-mbranches-within-32B-boundaries -nostandard-realloc-lhs
-align array32byte -auto -ljemalloc -L/usr/local/jemalloc64-5.0.1/lib
```

Peak Compiler Invocation

C benchmarks:
```
icx
```

C++ benchmarks:
```
icpx
```

Fortran benchmarks:
```
ifort
```

Benchmarks using both Fortran and C:

521.wrf_r: `ifort icc`

527.cam4_r: `ifort icx`

Benchmarks using both C and C++:

511.povray_r: `icpc icc`

526.blender_r: `icpx icx`

Benchmarks using Fortran, C, and C++:
```
icpx icx ifort
```

Peak Portability Flags

```
Same as Base Portability Flags
```

SPEC CPU®2017 Floating Point Rate Result
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Peak Optimization Flags

C benchmarks:

519.lbm_r: basepeak = yes

538.imagick_r: basepeak = yes

544.nab_r: -w -std=c11 -m64 -Wl,-z,muldefs -xCORE-AVX512 -flto
-Ofast -qopt-mem-layout-trans=4
-fimf-accuracy-bits=14:sqrt
-mbranches-within-32B-boundaries -ljemalloc
-L/usr/local/jemalloc64-5.0.1/lib

C++ benchmarks:

508.namd_r: basepeak = yes

510.parest_r: -w -m64 -Wl,-z,muldefs -xCORE-AVX512 -Ofast -ffast-math
-flto -mfpmath=sse -funroll-loops
-qopt-mem-layout-trans=4 -mbranches-within-32B-boundaries
-ljemalloc -L/usr/local/jemalloc64-5.0.1/lib

Fortran benchmarks:

503.bwaves_r: -w -m64 -Wl,-z,muldefs -xCORE-AVX512 -O3 -ipo
-no-prec-div -qopt-prefetch -ffinite-math-only
-qopt-multiple-gather-scatter-by-shuffles
-qopt-mem-layout-trans=4 -nostandard-realloc-lhs
-align array32byte -auto -mbranches-within-32B-boundaries
-ljemalloc -L/usr/local/jemalloc64-5.0.1/lib

549.fotonik3d_r: basepeak = yes

554.roms_r: Same as 503.bwaves_r

Benchmarks using both Fortran and C:

521.wrf_r: -prof-gen(pass 1) -prof-use(pass 2) -xCORE-AVX512 -O3
-ipo -no-prec-div -qopt-prefetch -ffinite-math-only
-qopt-multiple-gather-scatter-by-shuffles
-qopt-mem-layout-trans=4 -mbranches-within-32B-boundaries
-nostandard-realloc-lhs -align array32byte -auto
-L/usr/local/jemalloc64-5.0.1/lib -ljemalloc

527.cam4_r: basepeak = yes

(Continued on next page)

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Peak Optimization Flags (Continued)

Benchmarks using both C and C++:

511.povray_r: `-prof-gen(pass 1) -prof-use(pass 2) -xCORE-AVX512 -O3 -ipo -no-prec-div -qopt-prefetch -ffinite-math-only -qopt-multiple-gather-scatter-by-shuffles -qopt-mem-layout-trans=4 -mbranches-within-32B-boundaries -L/usr/local/jemalloc64-5.0.1/lib -ljemalloc`

526.blender_r: `basepeak = yes`

Benchmarks using Fortran, C, and C++:

507.cactuBSSN_r: `basepeak = yes`

The flags files that were used to format this result can be browsed at
`http://www.spec.org/cpu2017/flags/Intel-ic2021-official-linux64_revA.html`
`http://www.spec.org/cpu2017/flags/Dell-Platform-Flags-PowerEdge-Intel-ICX-rev1.4.html`

You can also download the XML flags sources by saving the following links:
`http://www.spec.org/cpu2017/flags/Intel-ic2021-official-linux64_revA.xml`
`http://www.spec.org/cpu2017/flags/Dell-Platform-Flags-PowerEdge-Intel-ICX-rev1.4.xml`

For questions about this result, please contact the tester. For other inquiries, please contact info@spec.org.

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